

CLAIMS

We Claim:

- 1 1. An apparatus comprising:
2 a polymer-based material; and
3 a plurality of magnetically aligned magnetic material particles in said polymer-
4 based material that form an electrically conductive path through a part of said polymer-
5 based material.
- 1 2. The apparatus of claim 1 wherein said polymer-based material is selected from
2 a group consisting of conductive polymers, thermoplastic polymers, and thermoset
3 polymers.
- 1 3. The apparatus of claim 1 wherein said polymer-based material is a polyamide.
- 1 4. The apparatus of claim 1 wherein said polymer-based material is an ultra-violet
2 light curable epoxy.
- 1 5. The apparatus of claim 1 wherein said magnetic material is selected from a
2 group consisting of ferro-magnetic metal, a magnetic ceramic, and a ferro-electric
3 material.
- 1 6. The apparatus of claim 1 wherein said apparatus is comprised of approximately
2 40 percent by weight polymer-based material and approximately 60 percent by weight
3 magnetic material particles.

1 7. The apparatus of claim 1 wherein said magnetic material particles are acicular
2 shaped.

1 8. The apparatus of claim 1 wherein said polymer-based material is a photo-resist
2 material.

1 9. The apparatus of claim 1 wherein said magnetic material particles are to form
2 part of the electrically conductive path from a component to an underlying substrate.

1 10. The apparatus of claim 1 wherein dimensions of the magnetic material particles
2 are approximately one micron by two microns by ten microns.

1 11. The apparatus of claim 1 wherein said magnetic material is selected from a
2 group consisting of iron, barium strontium titanate, strontium tantalum oxide, and
3 peroskovites.

1 ~~12.~~ A method comprising:
2 mixing a composition of magnetic material particles and a polymer-based
3 material;
4 depositing said composition onto a first component;
5 placing a second component onto said first component at a site of the deposited
6 composition;
7 applying a magnetic field to said composition, to form an aligned path of said
8 magnetic material particles and to bend said aligned path of magnetic material particles

9 to form part of a conductive path between said first component and said second
10 component; and
11 solidifying said polymer-based material.

1 13. The method of claim 12 further comprising putting said composition through a
2 screen before said depositing.

1 14. The method of claim 13 wherein said putting includes using a squeegee.

1 15. The method of claim 12 further comprising pre-coating said first component
2 before said depositing.

1 16. The method of claim 15 wherein said pre-coating comprises applying a thin
2 layer of said composition.

1 17. The method of claim 12 further comprising testing the conductive path between
2 said first component and said second component.

1 18. The method of claim 12 wherein said solidifying includes applying an ultra-
2 violet light to said composition.

1 19. The method of claim 12 wherein solidifying includes changing said polymer-
2 based material's temperature.

1 20. The method of claim 12 wherein said polymer-based material is solidified and
2 said magnetic field is applied at approximately a same time.

1 21. The method of claim 12 wherein applying a magnetic field includes using the
2 magnetic field from a metallic surface to bend the aligned path.

1 22. The method of claim 12 wherein mixing includes mixing the composition of
2 magnetic material particles having dimensions of approximately one micron by two
3 microns by ten microns.

1 23. A system comprising:
2 a substrate;
3 a component coupled to said substrate; and
4 a composition of magnetic material particles and a polymer-based material
5 coupled to said component and said substrate

1 24. The system of claim 23 further comprising screen pads coupled to said
2 substrate.

1 25. The system of claim 23 wherein said magnetic material particles include a
2 conductive path between said component and said substrate.

1 26. The system of claim 23 wherein said substrate is selected from a group
2 consisting of printable circuit boards, aluminum lead frames, and fine pitch ball grid
3 arrays.

1 27. The system of claim 23 wherein said composition is comprised of
2 approximately 40 percent by weight of the polymer-based material and approximately
3 60 percent by weight of the magnetic material particles.

1 28. The system of claim 23 wherein said magnetic material particles are acicular
2 shaped.

1 29. The system of claim 23 wherein said polymer-based material is a photo-resist
2 material.

1 30. The system of claim 23 wherein a coefficient of thermal expansion of the
2 polymer-based material is approximately equal to a coefficient of thermal expansion of
3 the substrate.